



**Engineering
Heritage
National
Landmark
Award Ceremony for
Rock Bolting
Development Site**

During clearing operations for a new walking track in Lambie Gorge, Cooma a historic site was uncovered behind a blackberry infested rock pile. The site is adjacent to the old Snowy Mountains Hydro-Electric Authority's Scientific Services laboratories, where rock bolting for support of tunnels and underground caverns was developed by the Authority some 50 years ago. The rock faces and rock bolt experiments conducted by staff of the Authority at this site can now be seen, still in good shape.

The SMA's development of support of rock and excavations using rock bolts, not only provided a vastly more economic and comprehensive construction facility, but it also speeded up tunnelling operations; in doing so it revolutionised hard rock tunnelling world-wide.

It was realised that this well-preserved site represented an important part of the testing and development of the rock bolts themselves. The site is readily accessible to the public and the whole story of the rock bolting heritage can be told there, whereas the tunnels are mainly out of reach! So because of its heritage significance, the site has been awarded a Engineering Heritage National Landmark.

As part of the celebrations for the 60th anniversary of the start of the Snowy Mountains Scheme (now owned by Snowy Hydro Limited), a dedication ceremony was held on 18 October 2009 near the Lambie Gorge site, hosted by the Monaro Group of Engineers Australia. Here, Group Chairman, Richard Clarke introduced Cooma Mayor Vin Good, Rae Solomon-Stewart an indigenous Ngarigo Nation elder, Peter Godfrey, Engineers Australia



EA National President Peter Godfrey scaling the "Rock Bolt Heights"

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ACT Tree Planting Has Links to Engineering Heritage

A tree planting by Engineers Australia held in the ACT on 19th May has a direct link to a similar activity held 83 years earlier, one that has been acknowledged under the Engineering Heritage Recognition Program.

In August 1926 the Institution of Engineers, Australia participated in a program of tree



Peter Godfrey, National President Engineers Australia, Jon Stanhope MLA, ACT Chief Minister, Peter Taylor, Chief Executive Engineers Australia and Tom Brimson, President Engineers Australia (Canberra Division) enjoy a lighter moment after officiating at the ceremonial first planting of trees as part of the Engineers Australia Forest at the Canberra National Arboretum and Gardens.

plantings by professional institutions in the fledgling ACT to "create greater public interest in our National Capital". The event was led by the National Committee of the Institution and included such luminary engineers as Bradfield and Butters. Many of these original trees planted in Manuka Circle remain and their significance was recognised by Engineering Heritage Australia in August 2001 with a Historic Engineering Marker (now Engineering Heritage Marker).

Jump forward to May this year and the creation of the Canberra National

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Adaptive Reuse of the Kingston Powerhouse

The Kingston Powerhouse was the first permanent building constructed in Canberra after its selection as National Capital. Designed by John Smith Murdoch and constructed in 1915 as a coal fired station with reciprocating steam engines, it supplied electricity to Canberra until the 1950s when it was decommissioned and became a storage area and workshop.

The significance of the Powerhouse was recognised by the National Trust, and included in the Register of the National Estate, the ACT Heritage Register and the Royal Australian Institute of Architects Register of Significant 20th Century Buildings. It was plaqued with a Historic Engineering Marker by Engineers Australia in 1998, but the recognition of the building and its 1993 conservation management plan were too late to save most of the operational content which had been relocated or sold for scrap some 30 years earlier.

The site of the Powerhouse received new interest with the redevelopment of the industrial area of Kingston (originally sited along the banks of the Molonglo River to provide cooling water for steam plant), becoming the Kingston Foreshore, with luxury apartments overlooking Lake Burley Griffin. Plans for the site were developed around 2000, with the Powerhouse to be featured in an arts and cultural precinct. In 2003 the ACT Government selected the new use for the building as a contemporary glass centre. Combined studio facilities and equipment for artists were planned to allow expanded work spaces and greater public access to the emerging attraction that had developed since the 1980s at the Canberra School of Art.

The refurbished Powerhouse building opened to the public in May 2007. Major spaces of the boiler floor and generator hall



The Powerhouse today

have been retained sympathetically with the installation of a full hot-shop in place of boilers, and less heat intensive glass blowing and mosaic work conducted in the generating hall. An elevated public gallery has been constructed around these spaces to allow safe observation of skilled demonstrators in

both areas, as well as closer examination of the original coal hoppers, gantry crane and the building fabric and features that have been retained. The economiser annex has become the main public entrance, incorporating glass studios and visitor facilities which include a coffee shop. The brick base of the chimney-stack, with its exhaust tunnel from the economiser, has been

skilfully transformed into a smaller display studio, while retaining its original form. Outside the building the commanding ash hopper and conveyor has had a section of rail tracks reinstated below to interpret the passage of coal to fuel the power station and the exit of ash.

The first anniversary of the glassworks was celebrated in May 2008 with an open day and outside broadcast by ABC local radio. Engineering Heritage Canberra participated in the broadcast with Arts ACT, to give a flavour of the history of the place and its social importance to Canberra. The steam whistle, which had been silent for many years, was sounded again to mark the occasion.

In the following month the Canberra Chapter, Royal Australian Institute of Architects, presented Tanner Architects with its Heritage Architecture Award. The jury commented that the spaces of the heritage building brought richness to the new function in a manner that might otherwise not have been possible.

The Canberra Glassworks has had a very successful two years in an outstanding facility that allows a major expansion of the creation of art glass and its exhibition to the public. While interpretive signs through the building go part of the way in giving visitors an understanding of the original function of the former Powerhouse, much more can be done. Unfortunately some features have been lost during the transformation, including the location of the boiler bases and their under-floor chambers, along with the condenser pit and the associated opportunity to physically interpret the steam generation cycle. A full scale photographic mural of one of the Bellis & Morcom engines and alternator has been used in the generator hall, but its placement where the high voltage switchboard had been is a compromise that is slightly misleading. A greater range of interpretive panels, floor markings, use of remaining artefacts, interactive displays, and brochures would provide guidance to interested visitors about the social and functional history of the place along with its present use. Engineering Heritage Canberra continues to discuss the possible addition of these improvements with the Glassworks management team, and we are liaising to rededicate the Historic Engineering Marker in a prominent place in the building.

Keith Baker



Hot-shop in former Boiler Room

Continued from page 1 - Engineering Heritage National Landmark

National President, Ken Lister of Snowy Hydro, Damien Kenneally of SMEC and Peter Hitchiner, Sydney Division EA President, all of whom spoke about aspects of the rock bolting development to a large gathering of invited guests and registrants to the Snowy's anniversary reunion. A presentation was made to Wally Mills for his untiring work in bringing to fruition recognition of the heritage site and of the original people involved in rock bolting support, some of whom were present.

The ceremony was completed by Peter Godfrey officially declaring the dedication by dramatically pressing buttons which caused pictures of the heritage marker and the interpretative sign to be thrown up for the audience of some 350.

After the ceremony nearly 100 interested members walked some 800 m to the site where they could view the old embedded rock bolts and the signs mounted on the mini cliff face. Among the distinguished guests not already mentioned were Steve and Mrs Finlay - Executive Director, Engineers Sydney and Simon Wiltshier - Chair Sydney Engineering Heritage Committee.

In addition, the Monaro Group was honoured to have present Margaret Hollander who is the eldest daughter of Thomas A Lang, the instigator of the research into the new way of using rock bolts. Also, Kaiser Corporation was represented by Berle Blehm from the USA, their former member who worked on perfecting the first comprehensive grouting of more than 10,000 rock bolts used in the Tumut 2 underground project in 1960.

A special feature of the 60th Reunion crowd was the presence of three grandsons of the founding Commissioner of the SMA 1949-67, the late Sir William Hudson. Naturally, many present wanted to acknowledge Sir William's great and visionary engineering leadership to his descendants.

Hugh Darby - Monaro Group, Engineers Australia

Green Light for Snowy Scheme Collection Museum

The Adaminaby (NSW) Snowy Scheme Collection Committee (ASSCC) celebrated recently as their vision for a museum collection to celebrate the Snowy Scheme took a step closer to fruition, with the granting of development approval for the planned museum complex to be built in Adaminaby. With the granting of approval, it is hoped that earth works can commence almost immediately.

The central role of Adaminaby in the Snowy Scheme started from day one. Construction of the Scheme commenced on 17th October 1949 with a symbolic explosion in a nearby quarry to supply materials for the construction of Eucumbene Dam, the main storage for the world's most complex water diversion and hydro-electric scheme. The main emphasis of the Scheme was diversion from the Snowy River catchment to the Murray/Murrumbidgee catchments with payment for the Scheme to be provided by sales of electricity.

Adaminaby, initially as the township of Seymour, was settled in the 1860s. It overlooked a wide valley through which flowed Frying Pan Creek to join the Eucumbene River, main tributary of the Snowy. This valley forms the major water storage for Eucumbene reservoir. As much of Adaminaby would be inundated, the town was moved 7 km early in the construction of the Scheme to a location over a low section of the Divide from the Snowy to the Murrumbidgee catchment.

Forward to 6th April 2002 when Kennedy Bros, a local earthmoving contracting business, auctioned their old earthmoving equipment and trucks, many of which dated back to their subcontracting days on the Snowy Scheme. This was the spur for district residents to form the ASSCC and they quickly raised \$40,000 to purchase 8 of the 10 items earmarked.

The ASSCC is a not-for-profit volunteer organisation that through the museum plans to build a permanent reminder of the impact on the nation of the construction of the Scheme, highlighting the technical achievements and the role played by people from many nations in

establishing multicultural Australia. The museum buildings will stand alongside the Snowy Mountains Highway near the Adaminaby town centre. The museum will comprise three buildings accessible from the central reception area. The central building will house delicate memorabilia, photographic displays, and an audio visual area containing old film footage, photograph and book archives and a worker identification process. Buildings 1 and 3 will house restoration, storage and display areas. These three buildings will form stage 1. As part of stage 2, the area between the buildings will be roofed to house construction machinery and vehicles, township and camp features and even a Bailey bridge. A façade in front of the museum buildings will display community art, depicting historical features of the Scheme. Adjacent to the entrance will be an impressive 330 kV electricity supply pylon donated by Transgrid, the Scheme's major transmission line contractor.

It is 35 years since the Scheme was completed, and the personnel and companies involved have dispersed. As a result, ASSCC has had difficulty gaining sponsorships and raising funds. Federal and State Government grants and local fundraising have contributed sufficient funds to build stage 1. For stage 2, the ASSCC is still hopeful that the original major contractors in the Scheme will be able to contribute. The ASSCC would welcome support through tax deductible donations. For further information, or to become a 'Friend' of the collection, go to the website at: www.snowyschemecollection.com.au.

The building of the Snowy Mountains Hydro-Electric Scheme was a pivotal event in Australia's history. Not only did it create one of the engineering wonders of the modern world, it also laid the foundations of a uniquely multicultural nation as workers from many countries, only recently at war, united to work together in Australia's high country. In harsh conditions, they built a new future for themselves and for the nation. The Snowy Scheme Collection at Adaminaby plans to record their story and make it available for future generations to share.

Noel Carter (ASSCC)



Continued from page 1 - ACT Tree Planting Has Links to Engineering Heritage

Arboretum and Gardens west of Lake Burley Griffin provided the perfect opportunity for the Canberra Division of Engineers Australia to contribute to this place of national significance, and in doing so providing both a tangible recognition of the contribution of engineers to the construction and maintenance of the Nation's capital and a historic link to the earlier plantings of 1926. The species chosen for the 'Engineers Australia Forest' is Pin Oak, one of the species originally planted in Manuka. The forest, when completed, will be one of 22 to be planted this year, which will be in addition to the 20 forests of over 10 000 trees planted in 2008. The overall plan for the arboretum calls for a planned 100 forests and 100 gardens to be planted in stages over the coming years.

Officiating at the planting were Jon Stanhope MLA, ACT Chief Minister, Peter Godfrey, National President Engineers Australia, Peter Taylor, Chief Executive Engineers Australia and Tom Brimson, President Engineers Australia (Canberra Division). Despite cool late autumn temperatures, the event was well attended by members and guests of Engineers Australia and it received significant media coverage.

See <http://www.cmd.act.gov.au/arboretum> for further information on the Canberra National Arboretum and Gardens.

Lyndon Tilbrook - Engineering Heritage Canberra

Marker Sites Now

This column reports on changes, new developments and threats to sites which have been marked in the EHA Heritage Recognition Program and its predecessors.

Ross Bridge Tasmania (HEM 2003, NEL 2009)

This beautiful three-arch masonry bridge in central Tasmania was built by convicts in 1836. It awarded a Historic Engineering Marker (HEM) in 2003. Engineering Heritage Tasmania requested an upgrade to a National Engineering Landmark on the basis that it was placed in the top ten Tasmanian heritage icons by the National Trust (Tasmania) and that the threshold for NEL awards had been clarified in recent times. EHA's Heritage Recognition Committee re-assessed the significance of the bridge and agreed to the upgrade in February 2009, the first upgrade EHA has made.

Kingston Powerhouse now Canberra Glassworks (HEM 1998)

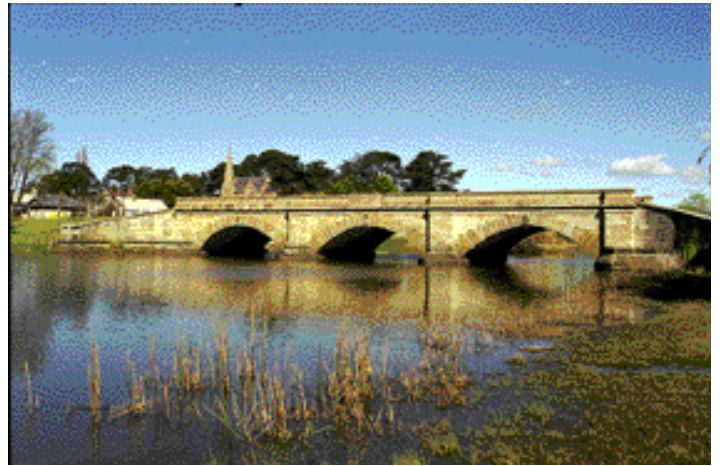
The Chief Minister of the ACT has announced a new public artwork for Canberra, to comprise a tower of glass and light to interpret the former smokestack at the Kingston Powerhouse, now the home of the Canberra Glassworks, a glass arts workshop. The tower will rise to a height of 22 m from the original smokestack base and is designed to create a tangible connection by day and by night between the heritage of the building and its contemporary use as a glass art centre. The Kingston Powerhouse is Canberra's oldest permanent public building, having been completed in 1915.

Sydney Street Lighting (HEM 2004)

On 8 July 1904 the Lady Mayoress of Sydney switched on Sydney's electric street light system. It comprised 200 arc lamps using electricity from Pyrmont Power Station. A ceremony was held on 8 July 2004 to commemorate the centenary and award a HEM marker to the scheme. At the time four sites were under consideration for mounting of the plaque however to date no approval has been received for a suitable site. Sydney Division Heritage Committee is continuing to seek a solution.

Lake Margaret Power Scheme Tasmania (HEM 2008)

Built by the Mt Lyell Mining & Railway Company in 1914, this hydro-electric power scheme on Tasmania's West Coast supplied power to the mine and Queenstown. Ownership transferred to the Hydro-Electric Commission in 1985. The 2 MW lower station was closed in 1994 and the 8.4 MW upper station in 2006, mainly because its 2 km long wood-stave pipeline was no longer safe. The great news is that Hydro Tasmania is now refurbishing all the original upper station machines and building a new wood-stave pipeline with a view to recommissioning the scheme in 2009, thus conserving the heritage values for future generations.



The 1836 Ross Bridge, now upgraded to a National Engineering Landmark

*Thanks to all the authors who contributed material to this column.
Edited by Owen Peake.*

John Monash Medal 2009



*Richard Hartley,
October 2009*

Engineering Heritage Australia has awarded the 2009 John Monash Medal to Dr Richard Hartley of Western Australia for his outstanding contribution to the conservation of our engineering heritage. A civil engineer turned historian, Dr Hartley's history degree theses were titled "*The influence of Herbert Hoover and Bewick Moreing & Co on the WA goldfields to 1904*", and "*A history of technological change in Kalgoorlie gold metallurgy between 1895 and 1915*".

He has been an active member of the WA Engineering Heritage Panel since 1992, including three years as its secretary. For the Panel he researched and wrote National Engineering Landmark nominations for the East-West Telegraph and the Trans-Australia Railway (both in collaboration with South Australia), and Kalgoorlie-Boulder Mining, all as contributions to EHA's Centenary of Federation project in 2001. He has also produced Historic Engineering Marker nominations for the Ord River Dam (with Moulds & Hunt), and Register of the National Estate nominations for Mundaring Weir, Ord River Dam and Eucumbene Dam (with the Snowy Mountains Authority).

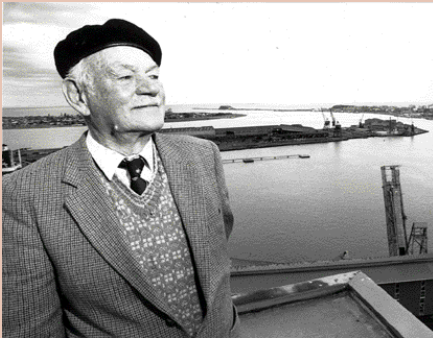
He has been a member of the National Trust of Australia (WA) from 1968, serving on three of their committees. He was a volunteer in the State Archives from 1984 to 1988, working on the records of the WA Government Railways drawings 1898-1920, and the Standard Gauge Railway Project drawings 1964-72. In 1995 Dr Hartley received an award from the State Library of WA (the Battye Library) for "excellent historical research" on the publication *Industry and Infrastructure in Western Australia 1829 to 1940*.

His historical interests in Kalgoorlie, the centenary of the Goldfields Water Supply (GWS) and the inadequacies in the historical writing on the GWS all persuaded him to embark on his book: *River of Steel - A History of the Western Australian Goldfields and Agricultural Water Supply 1903-2003*. Published in 2007, it took almost ten years of research, the last five funded by the Water Corporation of Western Australia. He recorded 32 oral history interviews for this project.

In 2009 he jointly prepared a successful nomination for the Goldfields Water Supply to be awarded an American Society of Civil Engineers International Historic Civil Engineering Landmark.

Bruce Cole - Engineering Heritage Australia

From The Past



The late Ian Stewart with his beloved engineered Newcastle harbour in the background.

The late Professor Ian Stewart was one of the instigators of engineering heritage activities within the Institution. His short piece reproduced below was published in the Newcastle Division newsletter in January 1990. Not only does he speak of the lack of volunteers we still find today, but gives a very concise description of the importance of engineering heritage.

Engineering Heritage Committee

The dedication of the plaque by the governor general to recognise the engineering achievement of Newcastle Harbour was the culmination of two years of study by the Heritage Committee. It was finally achieved by the endorsement of the National Heritage Panel of the Institution and by the ceremony organised by this division's special committee led by Colin Nunn. The excellent organisation and the wide publicity received were commended by the national panel.

This publicity illustrates the value of heritage activities in enhancing status of the profession. In fact, if we engineers do not publicly recognise and, where practicable, retain the achievements of past engineers, we cannot expect the public to recognise us. A further value for heritage studies has been found in engineering schools in other states, where some lecturers have found the study and reconstruction of engineering relics a valuable teaching method.

The changing engineering and mining scene in our region provides a challenge for rapid action in locating, recording and some opportunities for preserving engineering heritage items. It is important that we should maintain an Engineering Heritage Committee; this has also the advantage of giving us representation on the national panel.

All members of the division with some interest in any aspect of engineering history are invited to advise that interest to the division secretary. While we need one or two people who will meet regularly, it will be a great advantage to have a number of correspondents with special interests or knowledge.

*Prof Ian Stewart
(Supplied by Rod Caldwell)*

The Bridges of Perth -

An Engineers Australia Engineering Week Tour

During Engineering Week this year, the Engineering Heritage Panel of the WA Division of EA organised a conducted tour of six of Perth's major bridges, built between 1849 and 1982. Six members of EA, who were familiar with the bridges, accompanied 180 members of the public on the tour and provided commentary. In addition, each attendee was given an illustrated booklet describing the history of each bridge with design and construction details. Full details of the booklet are available on the EA website, follow the links: WA; Groups; Colleges and Branches; Engineering Heritage Panel.

In The Beginning!

When Governor James Stirling established the Swan River settlement in June 1829 he founded two initial townships, a port settlement on the southern side of the Swan River, which he named Fremantle, and an administrative capital on the north bank of the river which he named Perth. The sites for the two settlements on opposite banks of the river created an immediate need for bridges. The first bridge was built in 1843 at the eastern approach to Perth at a site known as the Causeway but money and resources to build a much larger structure across the river at Fremantle did not become available for another 20 years.

Fremantle Bridges

After 1850 a program of bridge construction was undertaken by convict labour under the supervision of a Company of Royal Engineers. They commenced work on the high level North Fremantle Bridge in 1863 and it was completed in 1867. An adjacent low level bridge was opened in 1898 and the renovated high level bridge was reopened in 1909, after which the low level bridge was demolished. The current traffic bridge was opened in 1939 and has been strengthened and upgraded since.

Causeway Bridges

New timber bridges over two arms of the Swan River were built in 1864. The existing bridges were built post World War 2, for which composite steel / concrete deck spans were designed by Main Roads WA Chief Bridge Engineer, E W C Godfrey. This method of construction had been used in Tasmania by Alan Knight from the 1930s. The concrete deck slabs were prestressed by securing the ends of the simply supported steel girders and jacking up at the third points, casting the concrete and, when cured, lowering the jacks, thus transferring longitudinal compression into the concrete. These bridges were opened in 1952.

Narrows Bridge, Perth

In March 1957 Main Roads WA awarded a contract to the joint venture of Christiani and Nielsen A/S, of Copenhagen, and local firm J O Clough & Son Pty Ltd, to

construct this elegant five span bridge designed by Maunsell and Partners. This ushered in a new era of prestressed concrete bridge construction in Western Australia. The 335 m long bridge superstructure comprised eight rows of precast 'T' beams post-tensioned with an innovative 19 wire, 17.5 mm

diameter strand system, with the cables placed externally to the webs. The precast units prior to post-tensioning were supported on timber trestles, which in turn were supported on timber piles.

At the time of its opening it was the largest precast, prestressed continuous beam bridge in the world and the first bridge in Australia to use a segmental construction method. It was declared a National Engineering Landmark in 1999.



The National Engineering Landmark Narrows Bridge with the double cantilever beams completed

HMAS Castlemaine



The engine room of HMAS Castlemaine.

HMAS *Castlemaine* (J244) was one of 60 Bathurst Class Australian Minesweepers, popularly known as corvettes, built in Australian shipyards during World War II as part of the Commonwealth Government's wartime shipbuilding program to increase the strength of the Royal Australian Navy. She was built by the Melbourne Harbour Trust at the Williamstown Dockyard during 1941-42 and was commissioned on 17 June 1942.

The ship displaces 650 tons, is 186 feet long, 31 feet beam and 8.25 feet draft. Propulsion is by twin 1800 horsepower, three-cylinder, triple-expansion steam engines, giving a maximum speed of 15 knots and an operational radius of 4000 miles at 10 knots. The two boilers are Yarrow Admiralty three drum type, oil fired, delivering steam at 200 psi.

Both the engine room and boiler room contain extensive steam powered auxiliary equipment including pumps, generators, evaporator and calorifier. There are also two diesel generators in the engine room.

Her first major assignment was to support Australian troops operating behind enemy lines in Timor. The operations were conducted out of Darwin and the rendezvous point was near Betano on the south coast of Timor. This was a dangerous task as the Japanese had a considerable presence throughout the Indonesian islands. *Castlemaine* made her first trip to Timor on the night of 7/8 November 1942, embarking troops and refugees before returning safely to Darwin.

Late in November 1942 it was decided to relieve the 212nd Australian Independent Company, operating in Timor, and three ships were allocated to the operation, corvettes *Castlemaine* and her sister ship *Armidale* plus the smaller tender HMAS *Kura*. HMAS *Kura* sailed from Darwin after dark on 28 November with the faster corvettes following in the early hours of the following morning. The corvettes were attacked by Japanese aircraft three times during the following day but repulsed these attacks without damage or casualties. Having been delayed by the air attacks they reached Betano on 1 December. In the meantime *Kura* had taken on board 77 refugees and one Australian soldier and sailed for Darwin.

Realising that it was now too late to proceed with the operation, as planned, *Castlemaine* and *Armidale* sailed for Darwin, catching up with *Kura* just after dawn. The passengers on *Kura* were transferred to *Castlemaine* whilst *Armidale* and *Kura* were sent back to Betano to complete the operation. The two ships encountered Japanese cruisers off the coast of Timor and the operation was cancelled. *Kura* and *Armidale* proceeded to Darwin but *Armidale* was attacked again by Japanese aircraft and was sunk with the loss of over 100 lives.

Castlemaine carried out escort and survey duties around the Australian and New Guinea coasts until the end of hostilities. She then proceeded to Hong Kong and joined the 21st and 22nd Minesweeping Flotillas, carrying out mine clearance operations. She returned to Australia in November 1945 and was paid off into reserve having steamed 117,000 miles on war service. *Castlemaine* remained in the Reserve Fleet ("mothball fleet") at Geelong until the mid 1950's when she became a static training vessel for engine room artificers at HMAS *Cerberus*, Flinders Naval Depot, Victoria.

In 1973 *Castlemaine* was gifted to the Maritime Trust of Australia for preservation as a museum ship. The Trust, with volunteer support, has faithfully restored the ship and it is now the last of the class still afloat. Her machinery is still fully serviceable but she no longer goes to sea. Periodic engine testing is carried out with the

ship firmly tied to her berth. *Castlemaine* can be inspected at weekends at Gem Pier, Williamstown, just a stone's throw from where she was built.



HMAS Castlemaine tied up at Gem Pier, Williamstown

Owen Peake

Continued from page 5 - The Bridges of Perth

Mt Henry Bridge

This bridge was designed by Main Roads WA and also constructed by the Clough organisation. Constructed 1979 – 1982, it consists of nine spans made up of precast double-cell, single box, post-tensioned concrete elements, each weighing up to 110 tonne. Clough used a steel truss falsework system supported on the permanent piers and the previously completed spans, the truss being supported by cables at the mid span which in turn were fixed to a steel tower which doubled as a crane, allowing it to lower the precast beam units onto the falsework. The tower was back-stayed to anchors in the previously completed superstructure. The BBR post-tensioning system was used. When completed, the bridge was (and remains) the longest road bridge in Western Australia. The falsework system won Engineers Australia WA Division Engineering Excellence Award in 1981.

Don Young

Comparing the View

A regular column by EHA past chair, Keith Baker

In my last column I remarked that the relationship between condition and integrity is not just an issue for buildings. Sometimes the improvements we make to the condition and serviceability of engineering works can reduce their heritage integrity. I have been thinking about this while driving recently from Canberra through Wagga Wagga and the Hunter Valley, where the contrasting treatment of timber truss bridges gives some good examples to consider.

When the timber piles and structure of bridges deteriorate, the deck on which traffic is carried becomes uneven and the load that can be safely carried is often downgraded. Although maintenance is carried out, some deterioration inevitably occurs over the century or more for which the bridges have been in service, while the volume of traffic and the loads carried are continually increasing. The bridges concerned frequently have heritage significance that may be formally recognised, and they usually have strong social significance for the local community, which values them as part of the district's historical identity and for their aesthetic setting. The bridge at Morpeth over the Hunter River is such a case where the approach spans have become very uneven and are being replaced, whilst the Allan Truss spans will be retained following earlier upgrading of the lower chords of the trusses.

Increasing traffic volume can present a dilemma for the authorities responsible for road infrastructure, giving the choice between minimal repair to timber bridges, structural upgrading to increase the load limit, or replacement with a modern reinforced concrete bridge which may provide additional traffic lanes as well as increased load capacity. The latter was the choice at Wagga Wagga, where the Allan Truss Hampden Bridge, plaqued by Engineering Heritage Australia in 1993, now looks sadly derelict and isolated beside the concrete Wiradjiri Bridge which carries the road traffic. The timber bridge was retained for pedestrian traffic, but with further deterioration is now closed and its fate will be the subject of a wider study to be undertaken by council.

By contrast, the Hinton Bridge over the Paterson River in the Hunter Valley has undergone extensive repairs and upgrading, incorporating steel plates into the lower chords of the timber Allan trusses, employing laminated timber decking on the truss spans, and extensive reconstruction of the approach spans and central steel lift span. The work has been carefully designed in cooperation with the NSW Department of Planning Heritage Branch to retain as far as possible the significant heritage features, while using scarce timber more sustainably, upgrading the load limit and minimising future maintenance. The approach of the RTA to the Hinton Bridge is regarded as a model for other timber truss bridges, and was awarded the Colin Crisp Award for Engineering Excellence in 2007.



Hampden Bridge and the HEM plaque taken recently.

The Tharwa Bridge over the Murrumbidgee River is another timber truss bridge which was plaqued by EHA on its centenary in 1995. It was to be replaced by a concrete bridge against the wishes of the local community and the conservation fraternity, but is now being retained and rebuilt. At present it is an Allan Truss bridge without trusses, and steel beams which will form part of the permanent structure now support the deck which is carrying light traffic while the trusses are rebuilt off-site. When the trusses are returned they will restore the general appearance of the bridge, and will increase the load carrying capacity to 44 tonnes, but the design of the truss spans will be technically altered to a greater extent than at the Hinton Bridge.

Conservation of timber bridges in their original form is not an option in most cases because of the need for increased capacity, the scarcity of large sections of structural grade timber, and the consequent more frequent major works to keep them in service. The unobtrusive introduction of steel into the timber trusses is a legitimate action to retain a modern function for the bridges concerned, and may be regarded as a limited form of adaptive reuse which is widely accepted for heritage buildings. It may be argued that the integrity of the original structure is diminished from a historical perspective, but this is a price that the community on balance, is prepared to accept for its retention in use. The heritage adage remains, to do as much as necessary but as little as possible.

Keith Baker

Recognised Engineering Heritage Works

Since our last edition went to press, the following works have been recognised under the Heritage Recognition Program. As we are still in the transition stage, markers of three types appear: National Engineering Landmark (NEL), National Engineering Heritage Landmark (NEHL), and Engineering Heritage Marker (EHM).

Ross Bridge (upgraded to NEL)	June 2009
Grafton to Brisbane National Railway Link (NEHL)	June 2009
Lambie Gorge Rockbolting Site, Cooma (NEHL)	October 2009
Sale Swing Bridge (NEHL)	November 2009
Port of Sale (EHM)	November 2009

Heritage Recognition of the 'Grafton to Brisbane National Railway Link'

On Saturday 13th June 2009, Engineering Heritage Australia Newcastle (EHAN) organised a ceremony to formally recognise the engineering heritage of the railway line extending from South Grafton (Grafton Railway Station) to Brisbane. The Heritage Recognition Ceremony was held as part of the E.A. Newcastle Division's Regional Convention held in Grafton from 12th to 14th June.

The railway subject of the heritage ceremony provided an appropriate historical background to the 'Transport and Communications' theme of the convention. Approximately 95 persons attended the ceremony, including convention attendees, VIPs and members of the local community.

The first speaker was EA National President Peter Godfrey, who introduced the Heritage Recognition Program of Engineers Australia to the gathering. Dr Robert Lee, noted railway historian from the University of Western Sydney, then recounted a short history of this railway. He said that he was thankful to have been asked by EHAN to research this railway, which was so rich and interesting, that he made the story into his latest book, 'The Fruits of Federation'. Dr Lee was keen to point out that the initiative and drive for development of the uniform gauge national railway system was undertaken by engineers.

EHAN engineer Bill Jordan thanked Dr Lee in return, for his most incisive research into the railway. It showed that the railway was of great importance politically for pioneering a Commonwealth and State managed program linking Australia with a 'uniform gauge' railway system. The railway included significant engineering accomplishments, including the double-deck bridge with an opening 'Bascule' span across the Clarence River and the Cougal Spiral elevating the railway into a long tunnel crossing under the border range into Queensland. For these achievements, the railway was accorded a National Engineering Heritage Landmark by EHA's national Heritage Recognition Committee.

The official guests, Mayor of Clarence Valley Council, Clr Ritchie Williamson and Federal Member for Page, Ms Janelle



The unique Clarence River rail/road bridge

Saffin MP representing the Minister for Transport, the Hon. Anthony Albanese MP, spoke eloquently of the local perspective of the railway and the Clarence River bridge.

A very local touch was then provided by bush poet Gary Fogarty, who read a poem that he had been commissioned to write for the ceremony by EHAN. The poem, 'Grafton to Brisbane Rail Link' was based on the railway's history, highlighting its meaning to the local community.

After the poem, the M.C. thanked the Guest of Honour, VIPs and other speakers. He then concluded the ceremony to a musical accompaniment by the Woodwind Ensemble, while guests relaxed to enjoy a fabulous view of the Clarence River, its 'bendy bridge' and the Grafton to Brisbane National Railway Link from the reception room of the South Grafton Ex-Services Club.

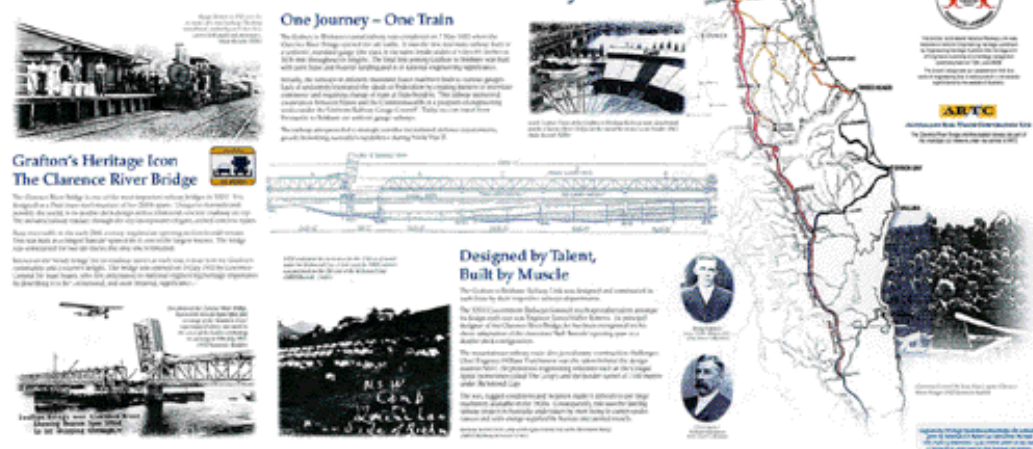
The Ceremony was important to EHA, in that it pioneered the new Heritage Recognition Markers that were approved by the Board of EHA for its Heritage Recognition Program the month before the ceremony. The bronze plaque previously used for its 'plaquing' program has been replaced by a more distinctive marker for both levels of award. The marker is made from a spun steel plate, coated with a colourful vitreous enamel surface highlighting the EA logo.

An interpretation panel to accompany each marker is also a

requirement of the revised Program. The panel will provide an opportunity for engineers to better engage with the public, showing that we care for our heritage and also to promote engineering as a career choice to students. The panel will allow EHA to tell the story and outline the heritage significance of the engineering works in our own words, but also in accordance with modern interpretation practice.

Rod Caldwell

The Grafton to Brisbane National Railway Link



The new style interpretation panel, as at Grafton, can show so much more than the old bronze plaque with its 80 word limit



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